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Original Research Article

CROSS SECTIONAL STUDY ON CLINICAL PROFILE OF NEONATAL SEPSIS IN LOW BIRTH WEIGHT BABIES

Sachin C U[1], Shivanagouda Joladarashi[2], Venkatesh G[3], Srinivasa arer[4]

[1]*Senior Resident, Department of Paediatrics, Shyamanuru Shivashankarappa Institute of Medical Sciences and Research Centre, Davanagere, India.*
[2,3]*Associate Professor, Department of Paediatrics, Gadag Institute of Medical Sciences, Gadag, India.*
[4]*Professor and Head, Department of Paediatrics, Gadag Institute of Medical Sciences, Gadag, India.*

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Corresponding Author:
Dr. Sachin C U,
Senior Resident, Department of Paediatrics,
ShyamanuruShivashankarappa Institute of Medical Sciences and Research Centre, Davanagere, India.
Email: sachinchoori@gmail.com

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ABSTRACT

Background: Infant mortality is still a major problem in the developing and underdeveloped countries around the world. Neonatal mortality rate (NMR) is a component of Infant mortality Rate (IMR) and it is universally regarded not only as an important indicator of community health status, but also as quality of life of people in general. **Objective:** to assess the clinical profile of early onset sepsis and late onset sepsis in low- birth-weight babies.
Materials and Methods: This Prospective Hospital based cross-sectional study was conducted in Gadag Institute of Medical Sciences, District hospital, Mallasamudra, Gadag. The study was conducted for a period of 18 months from January 2021 to June 2022. All the low birth weight babies with neonatal sepsis meeting the inclusion criteria were included in the study.
Results: There were a total of 2311 admissions. Out of which 1760 were inborn and 551 were out born. Out of 1760 who were inborn, 196 had sepsis. Early onset sepsis was seen among 137 neonates and late onset sepsis was seen among 59 neonates. Out of the 552 out born babies, 41 had early onset sepsis and 30 had late onset sepsis. In the current study 55.1% were male and 44.9% were female. Lethargy was the most observed clinical presentation present in 52.06%, followed by respiratory distress in 28.09% and poor feeding in 23.97%, hypoglycaemia in 22.47% of cases, other presentation include abnormal movements of limbs, fever, bulginganteriorfontanelle
Conclusion: Neonatal sepsis is higher in our setting and continues to be significant cause of mortality and morbidity. Incidence of sepsis in low-birth-weight babies was 31.94%.
Keywords: NICU, Septicaemia, Neonates, Blood culture.

INTRODUCTION

Neonates constitute the nation's foundation and Mothers are its pillars and no one can afford to neglect their needs and rights‖ UNICEF. Neonatal period is the most important period of all times as new- born are the most vulnerable to the conditions and deaths. Neonatal sepsis is one of the leading causes of neonatal mortality and morbidity.[1,2,3] Total of 2.4 million children died in 2020. There are roughly 6700 new-born deaths every day most of them occur duringthe first week of life, in 2019 about 1 million new-born died within first 24 hours.[4]
Preterm birth, parturition- related complications (birth asphyxia or lack of breathing at birth), infections and birth defects caused most neonatal deaths in 2019 world wide.[4] The mojor causes of neonatal deaths as per sample registration system (2015 – 17) in India are Prematurity & low birth weight (46.1%), Birth asphyxia &birth trauma (13.5%), Neonatal Pneumonia (11.3%), Other non-communicable diseases (8.4%), Sepsis (5.7%), III defined or cause unknown (5.3%), Congenital anomalies (4.3%), Diarrhoeal diseases (2.3%), Injuries (1.2%), Fever of unknown origin (1.4%) and all other remaining causes (0.6%).[5]
Low birth weight (LBW) is weight of a new- born lower than 2500 grams. The World Health Organisation (WHO) estimates that 15.5(over20million) of all new-borns world wide have LBW, 95% of whom live in the developing world. Neonatal sepsis defines the systemic condition

that arises from the bacterial, viral or fungal origin, associated with hemodynamic changes and clinical findings and causing severemorbidityandmortality.Neonatalsepsisisdivide dintotwotypesearlyonset sepsis and late onset sepsis. Early onset sepsis defined as sepsis developing within 72 hours of life and late onset sepsis developing after 72 hours and before 28 days.[6,7,8,9]

Low birth weight (LBW) is considered lower than 2500 grams and very low birthweight (VLBW)is lower than 1500g. Extremely low birth weight (ELBW) issued to describe babies lower than 1000g.Neonatal sepsis can also be defined as clinically diagnosed or verified by positive culture in a generally sterile body fluid. The gold standard for the opinion of neonatal sepsis is a positive culture in the blood, urine, cerebrospinal fluid, peritoneal fluid, or any other sterile tissues.[10,11]

The most important threat factor causing sepsis development in the neonatal period is premature birth and low birth weight. premature babies with low birth weight have a threat of developing sepsis three to ten times advanced than full- term babies with normal birth weight. Foetal distress, low APGAR score, resuscitation of the baby and themultiplepregnanciesincreasethethreat of early-onset sepsis, whereas invasive procedures, such as frequent blood sampling, intubation, mechanical ventilation, catheter/probe insertion, insufficient breastfeeding, long-term parenteral nutrition, low stomach acid and surgical interventions especially increase the risk of late-onset sepsis.

Hence this study is being conducted to assess the clinical profile of early onset sepsis and late onset sepsis in low- birth-weight babies.

MATERIALS AND METHODS

This Prospective Hospital based cross-sectional study was conducted in Gadag Institute of Medical Sciences, District hospital, Mallasamudra, Gadag. The study was conducted for a period of 18 months from January 2021 to June 2022.

Sample Size

According to the study conducted by B Sathyamurthy et al in Chennai the prevalence of the neonatal sepsis was 58. Sample size is calculated by applying the formula $4pq/d^2$ and sample size is taken as 267.

P =60

q =40

d=10%ofprevalence 4x60x40/62

n=267

Sampling method -purposive sampling

All the consecutive new-born babies with less than 2500 grams weight, admitted under NICU between January 2021 to June 2022 with neonatal sepsis are included under the studies

Study Subjects

Inclusion Criteria

1. All consecutive newborns <2.5kgs, with risk factors and suspected of neonatal sepsis are included in the study

Exclusion Criteria

2. Out born babiesal ready started on antibiotics are excluded from the study

Statistical method: Data was analysed using latest 24th version SPSS software. Association of various factors will be studied by chi-square test. Mean and standard deviation was calculated for the data.

Methodology

This study was conducted in NICU, GIMS, Gadag from January 2021 to June 2022 in low-birth-weight babies. 267 consecutive low birthweight babies with septicaemia are included in the study. Voluntary, wilful, and informed consent was taken from the parents. In neonates suspected of having neonatal sepsis detailed clinical history noted and examination done according to the pro-forma.1.5ml to 2ml venous blood was drawn under strict aseptic precautions.0.5-1 ml of which was transferred directly to BACTEC PEDS culture vials. The remaining portion was used for assessment of CRP by nephelometry method (quantitative method) and slide method (qualitative method), Total leucocyte count measured by flow cytometry method, cyanide free SLS method for Hb, DC sheath method for platelets, RBC, HCT. All the samples were transferred at room temperature as soon as possible to the laboratory. BACTEC vials was placed in BACT/ALERT system. A positive result is indicated by an audible alarm and the red illumination light at the sight of the inoculation as shown bythecomputermonitorattachedtothemachine. Thebottles wereincubatedfor5days before being reported as negative. A gram stain and a subculture on blood agar and MacConkey agar were performed from each presumptive positive vial. After incubation, the bacterial isolates are identified by gram staining, colony characteristics and biochemical tests. Antibiotic sensitivity was tested by KIRBY-BAUER disc diffusion method.

For all the babies less than 2500 grams and with risk factors for sepsis, above investigations will be sent and started on antibiotics, culture positive babies will be given antibiotics for 14 days according to sensitivity of antibiogram and CSF will be sent, if CSF study shows meningitis, then antibiotics will be given for 21 days according to sensitivity pattern.

RESULTS

There were a total of 2311 admissions. Out of which 1760 were inborn and 551 were out born. Out of 1760 who were inborn, 788 had <2500-gram weight, out ofwhich 196 had sepsis. Early onset sepsis was seen among 137 neonates and late onset sepsis was seen among 59 neonates. Out of the 552 out born babies, 295 had <2500- grams, 71 among them had sepsis.

Early onset sepsis was seen among 41 neonates and late onset sepsis was seen in 30 neonates.

In the current study, 55.1% were male and 44.9% were female. Among147 male babies, 95 had early onset sepsis and 52 had lateonset sepsis. [Table 1]

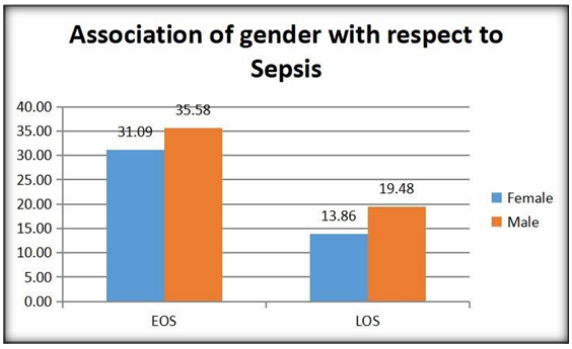

Figure 1: Association of gender with respect to Sepsis

In our study, majority of the neonates had birth weight in the range of 1000- 1499gi.e., 41.13%, followed by27.59% weighing <1000g and 22.37% weighing1500- 2499g. The mean birth weight was 1882.28±1082g. [Table 2]

The clinical presentation is as follows

Respiratory distress (71), Jaundice (39), (60), Lethargy(139), Abnormal movements (47), Hypothermia (6), Fever(36), Poor feeding (64), Bulging anterior fontanelle (20), Vomiting (9), Crying on moving limbs (4),Cyanosis(14), Excessive irritability (1)

The most common indication for admission was prematurity (44.19%),followed by sepsis (29.21%), respiratory distress (12.36%), birth asphyxia (4.87%) and other (9.36%). [Table 4]

In our study, most common mode of delivery was LSCS (50.94%), followed by normal vaginal delivery (47.94%) and only 1.12% had assisted delivery. [Table 5]

The neonatal sepsis profile observed in this study was as follows: 40 cases with pneumonia, 13 cases with meningitis, 6 with necrotizing enter ocolitis and 6 with septic arthritis.

In this study, total count was abnormal among246 babies, neutrophil count was abnormal in 8 babies, platelet was <100000 in 167 babies and abnormal CRP was seen among 255 babies. [Table 6]

In our study, probable sepsis was more commonly noticed(58.8%),followed by culture positive sepsis among 36.3% and clinical sepsis among 4.9%.

Out of 267 babies, 135(50.6%) had respiratory distress. Among267neonates, 42babies were given surfactant.

Respiratory support was given to 178(66.7%) of babies. Inourstudy,105 babies required CPAP/HFFFNC,60 required mechanical ventilation and 13 babies required oxygen by prongs/hood.

In the current study, out of 267 babies,77 babies required central line. Out of 267 babies, 88(32.96%) babies went into shock. [Table 7]

Table 1: Sepsis in Inborn vs Out born

	Inborn	Outborn	Total
Total admissions	1760	552	2311
<2500grams	788	295	1083
Episode of sepsis	196(73.41)	71(26.59)	267
EOS	137(51.31)	41(15.36)	178
LOS	59(22.10)	30(11.24)	89

Table 2. Sepsis in different birth weight category

Birthweight	No of babies with sepsis	NICU admission	Percentage
<1000g	8	29	27.59
1000-1499g	51	124	41.13
1500-2499g	208	930	22.37
Mean wt	1882.28	1083	

Table 3: Clinical Presentation

Clinical presentation	Noof cases	Percentage
Respiratorydistress	71	28.09
Jaundice	39	14.61
Hypoglycemia	60	22.47
Lethargy	139	52.06
abnormalmovements	47	17.60
Hypothermia	6	2.25
Fever	36	13.48
Poor feeding	64	23.97
Bulginganteriorfontanelle	20	7.49
Vomiting	9	3.37
Cryingonmovinglimbs	4	1.49
Cyanosis	14	5.24
Excessive irritability	1	0.37

Table 4: Indication for admission

Indicationfor admission	Noof cases	Percentage
Prematurity	118	44.19
Respiratorydistress	33	12.36
Birth Asphyxia	13	4.87
Sepsis	78	29.21
Other	25	9.36
Total	267	100.00

Table 5: Mode of delivery

Modeof delivery	Noof cases	Percentage
Assisteddelivery	3	1.12
LSCS	136	50.94
NVD	128	47.94
Total	267	100.00

Table 6: Neonatal sepsis profile

	Numberofcases	Percentage
pneumonia	40	14.98
meningitis	13	4.87
Necrotizingenterocolitis	06	2.25
Septic arthritis	06	2.25

Table 7: Types of sepsis

Types of sepsis	Number of cases	Percentage
Clinical	13	4.9
Cultural positive	97	36.3
Probable sepsis	157	58.8
Total	267	100.0

DISCUSSION

In the present there were a total of 2311 admissions. Out of which 1760 were inborn and 551 were out born. Out of 1760 who were inborn, 788 babies are <2500- gram babies, 196 had sepsis. Early onset sepsis was seen among 137 neonates and late onset sepsis was seen among 59 neonates. Out of the 551 out born babies, 295 babies are <2500-gram babies, 71 had sepsis. Early onset sepsis was seen in 41 and late onset sepsis was seen in 30 babies. In the current study, 55.1% were male and 44.9% were female. The ratio of male is to female in our study was like Massod et al (2011). Their study had 57% boys with male to female ratio of 1.32:1.0.[12]

Among 120 female neonates, 83 had early onset sepsis and 37 had late onset sepsis. Among 147 male babies, 95 had early onset sepsis and 52 had late onset sepsis.

The findings differed from a Bangladesh study by Hafsa et al.(2011), where out of 104 culturepositive neonates, EONS accounted for 68 cases(65.38%) and LONS accounted for 36cases(34.62%).[13] Babylon study also differed with our findings, in their study, a total of 29(58%) neonates were presented with EONS and21(42%) neonates were presented with LONS.[14] The results of a study carried by Dawodu et al in1997 was quite similar with the current study findings.[15] A study done by Karthikeyan Gand Premkumar K showed similar proportions of both EONS and LONS.[16]

In our study, majority of the neonates had birth weight in the range of 1000- 1499gi.e., 41.13%, followed by 27.59% weighing <1000g and 22.37% weighing1500- 2499g. The mean birth weight was 1882.28±1082g. In this study, total count was abnormal among 246 babies, neutrophil count was abnormal in 8 babies, platelets were <100000 in 167 babies and abnormal CRP was seen among 255 babies. In our study, probable sepsis was more commonly noticed (58.8%), followed by culture positive sepsis among 36.3% and clinical sepsis among 4.9%.

In a study carried out by Naher HS and Khamael AB had 33 (66%) neonates with low birth weight (<2500 g) while 7 (14%) neonates with very low birth weight (< 1500 g). The total count profile of the study subjects showed that, 84.31`% septicaemic neonates had normal white blood cell (WBC) count (5000-20,000/mm3), 35.88% had high WBC count (>20,000/mm3) and 9.80% had low WBC count (<5000/mm3). This study results differed from study by Naher et al where about half of neonates (56%) had normal white blood cellcount,16% had highWBC count and 28% had low WBC count.[14]

CONCLUSION

Neonatal sepsis is higher in our setting and continues to be significant cause of mortality and morbidity. Incidence of sepsis in low-birth-weight babies was 31.94%.

PPROM, maternal fever and chorioamnionitis were the most common risk factors associated with neonatal sepsis. Lethargy, poor feeding, respiratory distress, hypoglycaemias, abnormal movements were the most common clinical presentation.

Most of them had probable sepsis, culture was positive in 36% cases with more common in EOS than in LOS.

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